

A new species of *Rophites* from Armenia with comments on allied species

(Hymenoptera, Apoidea, Halictidae)

Andreas DUBITZKY

Abstract

Rophites schoenitzeri sp. n. from Armenia is described as new and compared to its sibling species *R. nigripes* FRIESE 1902. Together with *R. caucasicus* MORAWITZ 1875 these species constitute the *R. nigripes*-group, which is defined in the text. Relevant diagnostic features of the new species and *R. nigripes* are documented by SEM, and a key to the species of the *R. nigripes*-group is provided.

Introduction

The palearctic halictid bee genus *Rophites* SPINOLA ranges from Spain and northwest Africa (Morocco) to Asia minor eastward to Manchuria (EBMER & SCHWAMMBERGER, 1986). It contains about 15 described species and is most diverse in the eastern Mediterranean region and western parts of Asia (eastern Turkey and neighboring states).

Rophites is clearly characterized and differentiated from allied genera (esp. *Rhophitoides*) according to SCHWAMMBERGER (1975) and EBMER & SCHWAMMBERGER (1986) by the elongate and clearly flattened first three segments of the labial palp, by the galea which is considerably longer than maxillary palp and by the frons of females which bear thorn-like bristles, a feature probably unique for bees. EBMER (1984), EBMER & SCHWAMMBERGER (1986) and SCHWAMMBERGER (1975) thus maintain *Rophites* and *Rhophitoides* as separate genera, a concept which is followed in this paper. MICHENER (2000) however subgenerically divides *Rophites* into *Rhophitoides*, *Rophites* s.str. and the monotypic *Flavodufourea*, which was previously placed in *Rhophitoides* by SCHWAMMBERGER (1975). WARNCKE (1979, 1982) considered the genus *Rophites* in a much wider sense to include *Dufourea*, *Rhophitoides*, *Trilia*, *Morawitzella* and others as subgenera.

Presumably *Rophites* is oligolectic on Lamiaceae since several species (*R. quinquespinosus* SPINOLA 1808, *R. algerus* PÉREZ 1895, *R. hartmanni* FRIESE 1902, *R. caucasicus* MORAWITZ 1875) apparently prefer flowers of *Stachys* and *Betonica* (EBMER & SCHWAMMBERGER, 1986).

I was fortunate to discover the new species of *Rophites* from Armenia among the numerous undetermined bee specimens in the collection of the late Dr. R. W. GRÜN WALDT, which is now housed in the Zoologische Staatssammlung München (ZSM).

Methods and material

The specimens were photographed by scanning electron microscopy (SEM) using a Philips XL 20 SEM. Pinned and air-dried specimens were fixed with Leit-C-Plast on a object table and analyzed by 1.6 kV using a special low voltage anode (spot 4, integrate 1 or 4, slow scan 3). The hidden sterna and genitalia of the males were dissected from the metasoma and cleared in 10 % KOH for about 3 h. After washing with distilled water they were put in ethanol (75 %) and transferred to solutions of acetone (75 %, 85 %, 90 %, 95 % and 99 % for 10 min each). The samples were stored in 100 % acetone for 24 h, critical point dried using a BAL-TEC CPD 030 critical point dryer and sputtered for 120 sec with a Polaron SEM coating system. Structures prepared this way were analyzed by SEM using a conventional high voltage anode at 10 kV (spot 4.5, integrate 1, slow scan 3).

Material examined. Specimens of nearly all known species of *Rophites* (except *R. thracicus* EBMER 1993 and *R. transitorius* EBMER 1993) in the Biologiezentrum des Oberösterreichischen Landesmuseums, Linz (OLL), the ZSM and the collection of the author (CAD) were examined and compared to the new species.

Following abbreviations are used throughout the text: APAS 7: apical part of paired appendages of sternum 7 of male; AS: antennal segment; BL: body length; BPAS 7: basal part of paired appendages of sternum 7 of male; FWL: length of forewing; GS: gonostylus; S: metasomal sternum; T: metasomal tergum. Morphological terminology follows MICHENER (2000).

Rophites schoenitzeri sp. n.

Type material: Holotype: ♂, Armenia, vicinity of Wedi, Araxestal, Chosrow Nature Preservation Area, 10.-22.VI.1982, leg. W. DOLIN, ex coll. GRÜN WALDT (ZSM). Paratypes: 2♂♂, same data as holotype (ZSM, CAD), 4♂♂, Armenia, Chosrow Nature Preservation Area, 1.-6.VI.1982, ex coll. GRÜN WALDT (ZSM).

Description

Male. BL: 7.0-9.3 mm (8.3 mm). FWL: 5.7-6.1 mm (6.0 mm).

Structure: Head round, nearly as long as broad (0.93 times). Galea tessellate, dull. Clypeus twice as wide as long with strong honeycomb punctation. Supraclypeal area dull, with fine honeycomb punctation. Frons dull, median honeycomb punctation is considerably larger than that on supraclypeal area. Lateral parts of frons (area along inner margin of compound eye), paraoocular area, as well as main parts of vertex and genal area shiny with dense punctation. Distance from hind margin of lateral ocellus to hind margin of vertex 2.3 times as wide as diameter of lateral ocellus. Ventral margin of genal area 1.7 times as wide as compound eye in lateral view. Scape twice as long as broad with irregular wrinkle-like punctation. AS 3-12 about 1.7 times as long as broad, AS 13 at least 3 times as long as broad, apically clearly pointed. Scutum and scutellum shiny with distinct, dense punctation. Metanotum dull, with irregular small punctation. Mesepisterna shiny with irregular punctation which is most scattered dorsally. Propodeal triangular with strong longitudinal, parallel-sided wrinkles. Lateral parts as well as declivous part of propodeum weakly shiny with strong dense punctation. Middle tibia swollen with front margin strongly convex. Basitarsus of middle legs recognizable concave. Trochanter of hind legs with well-developed lobe-like projection, therefore strongly angulate in profile (Fig. 18). T smooth and shiny with prominent dense punctation except nearly impunctate marginal zone. Pygidial plate as wide as antennal flagellum, apically broadly rounded. S 1-5 shiny, with irregular dense punctation. Lateroapical part of S 6 with a pair of large, tooth-like projections nearly reaching lateral margin of basal part (Fig. 14). Median carina of ventral side of apical part of S 6 forming a strong tooth-like projection when viewed in profile. Apicolateral margin of BPAS 7 distinctly rectangular (Figs 10, 12). BPAS 7 tooth-like, considerably longer than half the length of basal part. Dorsal tooth-like projections of BPAS 7 elongate at least three times as long as wide (Figs 10-11). Shape of S 8 and genitalia as in Figs 4-6. GS strongly truncate, only tooth-like apical part protruding gonocoxite in lateral view.

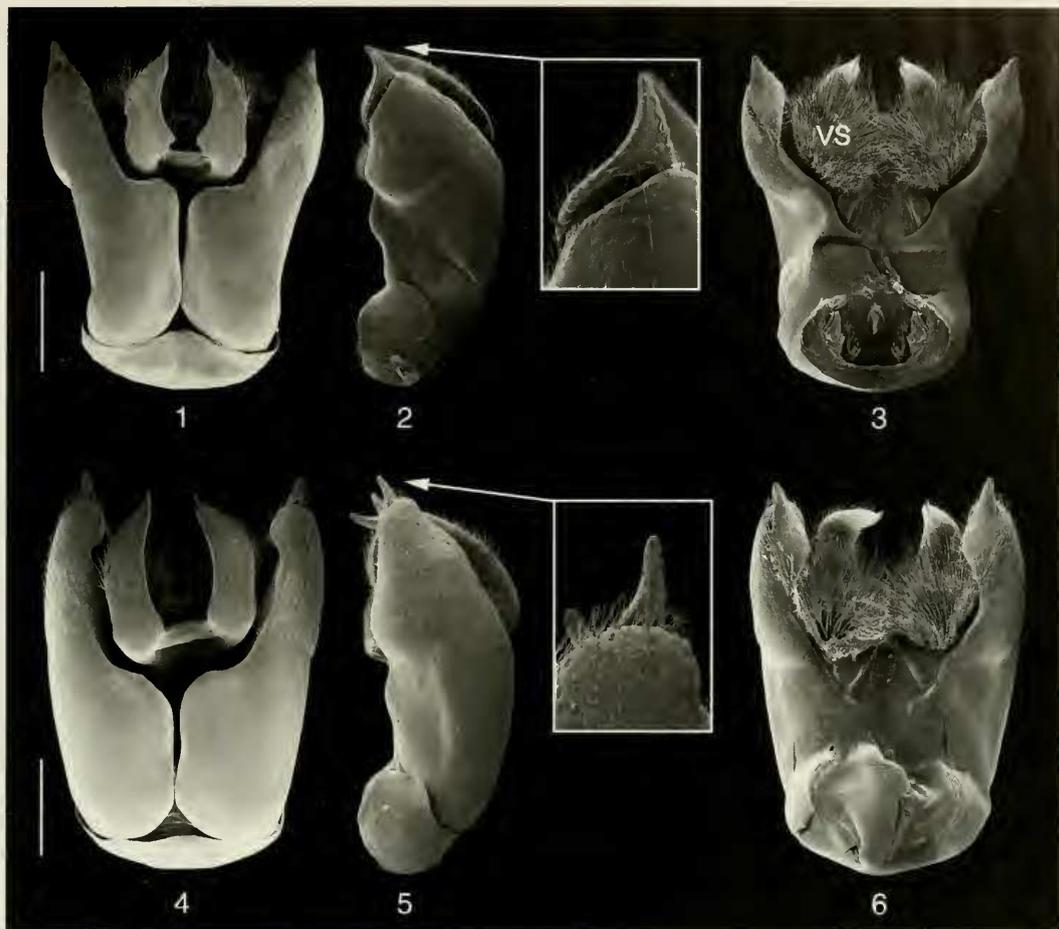
Integumental color: Mandibles black basally dark reddish brown apically. Antenna blackish dorsally, blackish brown to black colored ventrally. Other parts of head as well as thorax black. Legs black (coxa to tibia) to blackish brown (tarsi). Spurs of all legs bright yellowish gray colored. Claws grayish brown basally, reddish brown apically. Tegulae dark brownish transparent, veins of wings brownish, stigma dark brown. Metasoma black except brownish transparent marginal zone of T.

Pubescence: Hairs of whole body yellowish brown and of varying length.

Female. Unknown.

Diagnosis: The new species is very similar to *R. nigripes* from which it is clearly differentiated by the following characters (character states of *R. nigripes* in parentheses):

AS 4-13 black to blackish brown beneath (yellowish); trochanter of hind legs with lobe-like projection, Fig. 18 (trochanter angular in profile but without lobe-like projection, Fig. 17); apical part of S 6 with large tooth-like projections laterally, about 0.7 times as wide as basal part, Fig. 14 (lateral tooth-like projections smaller, apical part only half as wide as basal part, Fig. 13); apical part of S 6 with large ventroapical tooth medially (median ventroapical tooth strongly reduced to absent); BPAS 7 distinctly rectangular apicolaterally, without protruding lateroapical wings, Figs 10, 12 (acute, protruding lateroapical wings strongly



Figs 1-6. Male genitalia; left: dorsal view, middle: lateral view, window: detail of apical region of gonocoxite showing gonostylus, right: ventral view. 1-3, *R. nigripes* FRIESE; 4-6, *R. schoenitzeri* sp. n. VS: volsella. Scale bar: 250 μ m.

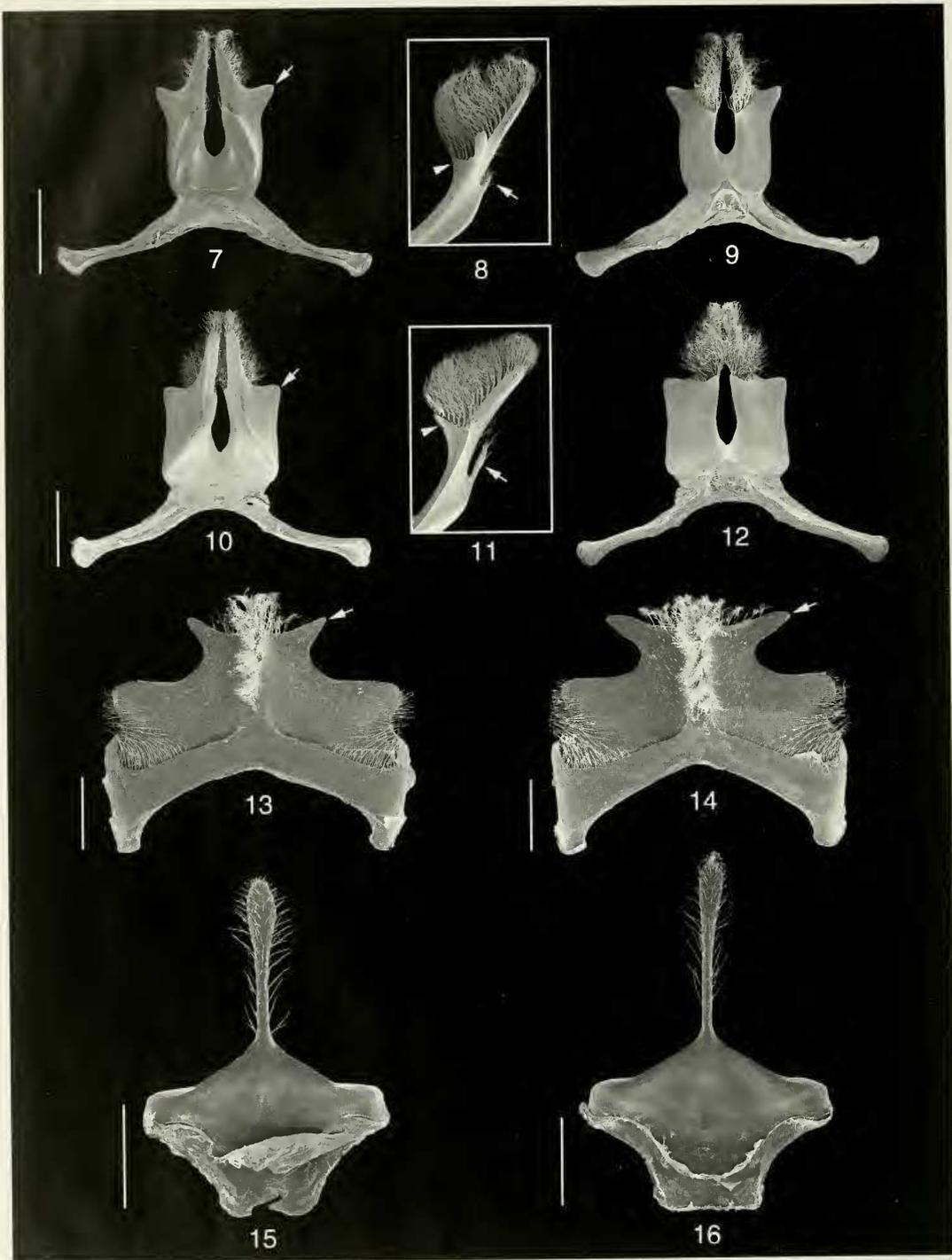
developed, Figs 7, 9); dorsal tooth-like projections of BPAS 7 long, Figs 10, 11 (short, Figs 7, 8); APAS 7 basally with long tooth-like projection on ventral side, Fig. 11 (tooth-like projection short, strongly reduced, Fig. 8); gonocoxite long, at least 2.5 times as long as broad in lateral view, Fig. 5 (truncate, only 2 times as long as broad, Fig. 2); apical part of gonocoxite hardly diverging, longer (1.3 times) than broad in lateral view, with dense punctation, Figs 4-6 (considerably diverging, as long as broad, with dispersed punctation, Figs 1-3); GS strongly truncate, only tooth-like apical part protruding gonocoxite in lateral view, Fig. 5 (GS distinctly protruding gonocoxite in lateral view, Fig. 2).

Etymology: The new species is named in honor of my supervisor and apidological mentor Prof. Dr. Klaus SCHÖNITZER.

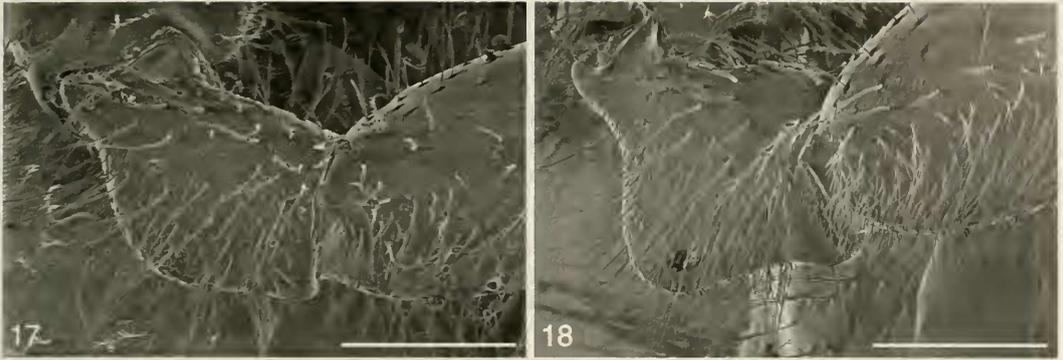
Discussion

In the genus *Rophites*, the species *R. nigripes*, *R. caucasicus* and *R. schoenitzeri* sp. n. form a distinct species group referred to as the “*R. nigripes*-group”. It is characterized by the following male features:

S 6 with two strong, tooth-like projections lateroapically (Figs 13, 14); appendages of S 7 more or less quadrangular basally, tooth-like apically (Figs 7, 9, 10, 12); volsella of male genitalia with long and dense



Figs 7-16. Male S 6 (13, 14), S 7 (7-12) and S 8 (15-16). 9, 12, 13-16, ventral view; 8, 11, lateral view; 7, 10, dorsal view. 7-9, 13, 15, *R. nigripes* FRIESE; 10-12, 14, 16, *R. schoenitzeri* sp. n. Arrows: Apicolateral part of BPAS 7 (7, 10), dorsal tooth-like projections of BPAS 7 (8, 11) and lateral tooth-like projections of S6 (13-14). Arrowheads: Ventral tooth-like projections basally of APAS 7 (8, 11). Scale bar: 250 μ m.



Figs 17-18. Trochanter of hind legs (male): 17, *R. nigripes* FRIESE; 18, *R. schoenitzeri* sp. n. Scale bar: 200 μ m.

pubescence, therefore hardly visible (Figs 3, 6); gonostylus truncate, spine-like apically, hardly protrudes gonocoxite laterally (Figs 1-6); trochanter of hind legs more or less carinate (except *R. caucasicus*). The hairy volsella as well as the shape of S 6 and 7 are unique features within *Rophites* and therefore represent solid autapomorphies for the species group.

Distribution

All species of the *R. nigripes*-group show a distinct distribution in the western part of Asia (Turkey to Caucasus). *R. nigripes* is the most western representative and *R. caucasicus* is restricted to the Caucasian mountain range in the north (EBMER, 1993). *R. schoenitzeri* sp. n. is apparently the most eastern species of the group. Aside from *R. algirus* Pérez 1895, *R. foveolatus* Friese 1900 and *R. mandibularis* Morawitz 1891, *R. schoenitzeri* sp. n. is the fourth species of *Rophites* recorded from Armenia (see also EBMER & SCHWAMMBERGER, 1986; EBMER, 1993).

Recognition

Using the species determination key in EBMER & SCHWAMMBERGER (1986) the new species would run out at *R. caucasicus*, however it is not consistent with the characters given there for the shape of AS 13 and the trochanter of hind legs. Determination of the new species is made possible in the following revised key to the species of the *R. nigripes*-group:

Key to the males of the *R. nigripes*-group:

1. AS 13 truncate, only twice as long as broad, apically broadly rounded; trochanter of hind legs rounded *R. caucasicus* MORAWITZ 1875
- AS 13 elongate, at least 3 times as long as broad, apically pointed; trochanter of hind legs angled 2
2. AS 4-13 yellowish beneath; trochanter of hind legs without lobe-like projection; S 6 as in Fig. 13, without strong ventroapical tooth medially; S 7 and 8 as shown in Figs 7-9 and 15; male genitalia as in Figs 1-3 *R. nigripes* FRIESE 1902
- AS 4-13 black to blackish brown beneath; trochanter of hind legs with strong lobe-like projection; S 6 as in Fig. 14, with strong ventroapical tooth medially; S 7 and 8 as shown in Figs 10-12 and 16; male genitalia as in Figs 4-6 *R. schoenitzeri* sp. n.

Zusammenfassung

Eine neue Schlärfbienenart aus Armenien, *Rophites schoenitzeri* sp. n. wird beschrieben und mit der ihr nah verwandten Art *R. nigripes* FRIESE 1902 verglichen. Zusammen mit *R. caucasicus* MORAWITZ 1875 bilden diese Arten die *R. nigripes*-Artengruppe, welche in diesem Zusammenhang definiert wird. Relevante Unterscheidungsmerkmale zwischen der neuen Art und *R. nigripes* werden rasterelektronenmikroskopisch dokumentiert und ein Bestimmungsschlüssel für die Arten der *R. nigripes*-Artengruppe wird präsentiert.

Acknowledgements

I am grateful to Mag. Fritz GUSENLEITNER (OLL) for the opportunity to study all species of *Rophites* in the WARNCKE-collection and for the loan of many specimens of this genus. I wish to thank Dr. Stefan SCHMIDT and Dipl. Biol. Johannes SCHUBERTH (ZSM) for providing undetermined bee material from the GRÜN WALDT-collection. Prof. Matthias STARCK and Mrs. Heidemarie GENSLER (both Munich) generously permitted use of the SEM facility at the Zoological Institute of Ludwig-Maximilians-Universität, Munich. Finally I am greatly indebted to Dr. John PLANT (Vienna) for his many helpful comments on the manuscript and for improving the English.

References

- EBMER, A. W. 1984: Die Arten der Gattung *Dufourea* LEPELETIER 1841 mit illustrierten Bestimmungstabellen (Insecta: Hymenoptera: Apoidea: Halictidae: Dufoureaeinae) – Senckenb. biol., **64**, 313-379
- EBMER, A. W. 1993: Die Bienengattung *Rophites* SPINOLA 1808 (Insecta: Hymenoptera: Apoidea: Halictidae: Rophitinae). Erster Nachtrag. – Linzer biol. Beitr., **25**, 3-14.
- EBMER, A. W. & K. H. SCHWAMMBERGER 1986: Die Bienengattung *Rophites* SPINOLA 1808 (Insecta: Hymenoptera: Apoidea: Halictidae: Dufoureaeinae). – Senckenb. biol., **66**, 271-304.
- SCHWAMMBERGER, K. H. 1975: Die bisher bekanntgewordenen Arten der Bienengattung *Rhopitoides* SCHENK (Hymenoptera: Apoidea: Halictidae). – Senckenb. biol., **56**, 57-63.
- MICHENER, C. D. 2000: The bees of the world. Baltimore and London: Johns Hopkins University Press.
- WARNCKE, K. 1979: Beitrag zur Bienenfauna des Iran: 3. Die Gattung *Rophites* SPIN., mit einer Revision der westpaläarktischen Arten der Bienengattung *Rophites* SPIN. – Boll. Mus. Civ. Stor. Nat. Venezia, **30**, 111-155.
- WARNCKE, K. 1982: Nachtrag zur Bienengattung *Rophites* in der Westpaläarktis. – Boll. Mus. Civ. Stor. Nat. Venezia, **32**, 167-169.

Author's address:

Andreas DUBITZKY
Zoologische Staatssammlung München
Münchhausenstr. 21
D-81247 München, Germany
E-mail: andreas_dubitzky@yahoo.de